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ABSTRACT

This case study of mentoring in a middle school reform-based mathematics classroom examines learning to teach from a participatory perspective on development. The participants' orientations toward mentoring were considered to capture previous experiences and understandings of the mentor and mentee. In addition, an analysis of the forms of participation and the apprenticeship of the mentee (Rogoff, 1995, 1997) were considered to understand how learning to teach took place on multiple planes of analysis. The study showed that learning to teach was grounded in the mentor and mentee's professional communities. Their guiding orientations of mentoring and forms of participation were influenced by these communities. An implication of the study is that we need to construct mentoring education to include a strong reform-based mathematics content in which normative practices of reflection and collaboration on teaching and learning are second nature to instructional practice. And, mentee education must be coordinated with mentoring education to capitalize on field and teacher education opportunities. (Author)

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# SOCIOCULTURAL PERSPECTIVES ON MENTORING MATHEMATICS STUDENT TEACHERS

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This case study of mentoring in a middle school reform-based mathematics classroom examines learning to teach from a participatory perspective on development. The participants' orientations toward mentoring were considered to capture previous experiences and understandings of the mentor and mentee. In addition, an analysis of the forms of participation and the apprenticeship of the mentee (Rogoff, 1995, 1997) were considered to understand how learning to teach took place on multiple planes of analysis. The study showed that learning to teach was grounded in the mentor and mentee's professional communities. Their guiding orientations of mentoring and forms of participation were influenced by these communities. An implication of the study is that we need to construct mentoring education to include a strong reform-based mathematics content in which normative practices of reflection and collaboration on teaching and learning are second nature to instructional practice. And, mentee education must be coordinated with mentoring education to capitalize on field and teacher education opportunities.

## Research Problem

Student teaching is considered by preservice teachers to be one of their most important experiences during teacher education. Undeniably, mentor teachers' actions, beliefs and knowledge play a large role in influencing the nature of this experience for student teachers (McIntyre, Byrd & Foxx, 1996). Research on mentoring documents the importance of mentors' beliefs and provides descriptive accounts of mentor and mentee interactions (Stanulis & Russell, 1998; Hawkey, 1997). However, there are other areas of research such as the context in which student teaching takes place that informs the experience but has typically been ignored by mentoring research (Warren-Little, 1990; Zeichner, 1986). Acknowledging the abundance of research that does not capture both the individual and the environment, Barbara Rogoff (1995, 1997) comments on learning and development in general, explaining that traditional research in these areas have either focused on the individual or the environment. This disconnect effectively limits the researcher's perspective by separating the individual from the environment. This separation of the individual and the environment and the nature of the research on mentoring points to a need for research to coordinate the influence of beliefs, the descriptions of interactions and the impact of the context in a way that acknowledges the interdependence of the these influences. This research coordinates these contributing factors to development posing the following research questions. What is the nature of apprenticeship in mentoring activity? What is the nature of guided participation in mentoring activity? And, what is the nature of individuals' influence on mentoring activity?



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## Conceptual Framework

This study analyzed mentoring as a sociocultural practice in which learning to teach took place through participation (Rogoff, 1995, 1997). Rogoff's interpretations of sociocultural theory provided a means to examine mentoring as a system of cultural practices, social interactions and individual understanding. More specifically, this system was (1) individuals' understandings or orientations brought to and developed by participation in mentoring, (2) the mentor's and mentee's participation with one another – the forms of participation constructed, and (3) the apprenticeship of student teachers within institutions or pertinent cultural contexts impacting mentoring. Participants' orientations to mentoring were frameworks, developed from past experiences and understandings of learning to teach and mentoring, that guided mentors' and mentees' participation. Rogoff (1995) suggests that development, or the taking on of more responsible roles in activity, takes place through changes in forms of participation. For example, a student teacher learns to teach by learning to taking on more responsibility for classroom teaching and student learning through changes in forms of participation. Apprenticeship in learning to teach is the way that a new member is brought into full membership through the systems of normative practices associated with mentoring learning to teach. To analyze these levels of influence on mentoring and record development I examined individuals' orientations to mentoring, the forms of participation constructed by the mentor and mentee, and how the normative practices of the professional communities to which participants belong were imported into mentoring practice.

## Methods

This study was undertaken within a university reform-based teacher education program. The secondary school selected for the study used reform-based curriculum (Connected Mathematics Project) as the site for learning to teach. The data collected were participant observations of the student teacher, cooperating teacher and other faculty engaged in mentoring practices inside and outside the classroom. All conversations were audio taped and transcribed, including formal initial and final interviews and informal interviews after each cycle of observation. During the informal interviews participants clarified their intentions and understanding of participation. In addition, they provided feedback on my interpretations of events. Participant quotes used in this text are followed by the data source in parentheses. Artifacts from lessons, meetings and emails were also collected. Data were analyzed using external codes based on the conceptual framework for the study and internal codes generated out of the data. Coding checks were conducted by an external researcher to verify consistency and thoroughness of coding. Analytic memos (Strauss, 1987) were constructed for each external code to identify the internal codes or patterns in the data. Vignettes were also constructed to capture the events within the case.

**Findings - Early in the Semester**

This paper reports on the data from mentoring a middle school mathematics preservice teacher to illustrate how the coordination of the three planes – cultural, social and individual -- of the conceptual framework provided greater understanding of learning to teach. Ms. Lane, the cooperating teacher, and Ms. Sekwiter, the student teacher, were paired in student teaching because Ms. Sekwiter suggested that she wanted a reform based middle school placement in which she could continue to develop her ideas of teaching in a problem based classroom. Ms. Sekwiter had previous field placements in reform based classrooms and suggested that she was very comfortable with problem-based curricula and student inquiry. Those previous placement were pivotal to Ms. Sekwiter's understanding of learning to teach. She said,

> [my teacher] just wanted me to get in there and get going, she just really wanted to see what I could do, what I thought... And it went really well and then she always helped me modify so that it would work even better the second time around (NS, I#1, p. 6).

Ms. Sekwiter's understandings of learning to teach developed from this experience. She thought that she was to try her ideas in student teaching and her mentor would tell her how to modify the "little things of teaching" that she needed to improve. Trying ideas was her orienting framework implying that Ms. Sekwiter was only interested in learning through experience. She comments,

> I need the chance to just do everything and try to handle everything all at once. ... how am I going to schedule the things that I need to do and is my perfect theory of what I would like to do going to be able to work ... I think the most important part for me was just I know what I want but can it really work (NS, I#1, p. 8).

As a result of focusing on trying her own ideas, Ms. Sekwiter resisted reflecting on ideas or incorporating Ms. Lane's suggestions into her teaching.

Ms. Lane's orientation to mentoring – reflective practice -- differed dramatically from Ms. Sekwiter's trying ideas. Ms. Lane commented, "... I want to know what they are thinking about, why they would do [something in instruction], tell them that it [is important] to have a reason to do it and they don't just do it without thinking about it" (PL, I#1, p. 33). Reflection was integral to Ms. Lane's ideas of teaching and learning to teach. Ms. Lane attempted to collaborate with Ms. Sekwiter by planning together, asking questions, and co-teaching. Ms. Lane reflected on the nature of these activities early in the semester saying,

> ... with Nan I don't see her asking as many questions back. So if she comes with an idea and I ask, what about this, what about that, she is already convinced [that her idea is fine], she doesn't modify...[T]hat is what I have seen

> so far. So it doesn't have any influence if you ask a question back. I want her to develop so that she understands that teaching, like for me, teaching is not done yet and it is never done, and [for Nan] it is like you want to student teach and then you are done and you know how to teach....(PL, I#1, p. 28).

Ms. Lane thought teaching and learning to teach was a process of developing ideas, questioning the ideas, trying ideas and modifying these ideas through reflecting.

The following is a vignette of Ms. Lane and Ms. Sekwiter's interactions early in student teaching. The vignette highlights Ms. Lane's collaborative efforts and Ms. Sekwiter's responses.

**Vignette**

Ms. Lane shows Ms. Sekwiter a pattern problem that she wants students to work with in class. She asks Ms. Sekwiter what they might want students to understand from the problem. Ms. Sekwiter answers quickly, "if they can show a general rule then you know they got it." Ms. Lane asks if there are other ways that students might show that they understand? Ms. Sekwiter appears confused and frustrated that Ms. Lane is not accepting her idea that if the students have a rule then they understand. Ms. Lane discusses the idea that they should allow for other ways for students to show what they know, suggesting that they try the problem in class and see if the students have different solutions. Ms. Lane teaches the lesson and students work in groups while Ms. Sekwiter helps a few groups.

The next day Ms. Lane asks Ms. Sekwiter about what she saw in class the day before and how they might use another pattern problem with the students. Ms. Sekwiter responds that she saw a lot of students not getting an algebraic rule and she guided them in their group to see the rule. Ms. Lane asked if there were other ways that students were seeing the pattern, like did she notice a group of students who described the rule recursively. Ms. Sekwiter sat listening passively. Ms. Lane suggested a way for Ms. Sekwiter to explore alternative solutions in class that day. Ms. Sekwiter never confirmed Ms. Lane's suggestion and added that maybe they could try modeling an algebraic general solution for a pattern to the whole class. Ms. Lane explores what Ms. Sekwiter thinks students will learn from this. She asks if Ms. Sekwiter thinks that they have time during the lesson to do all of this and allow the students to work. Ms. Sekwiter says, "I guess not." Ms. Sekwiter again looks frustrated that Ms. Lane is not acknowledging her idea for the lesson. Ms. Lane asks Ms. Sekwiter to introduce the problem and they both will work with groups during class. Ms. Sekwiter presents the problem without much discussion and begins to work with groups using her idea of showing them a model.

The following day, Ms. Lane has copies of students' work that use different methods to find the pattern. Ms. Lane starts planning by asking questions about the work. Ms. Sekwiter looks frustrated with Ms. Lane and walks away from the table changing

the subject asking about entering grades. Ms. Lane asks Ms. Sekwiter what sense she made out of the students' solutions yesterday. Ms. Sekwiter says from across the room that she thought that most of them got it but some were still not coming up with a rule. Ms. Lane looks frustrated and suggests that they try another problem and that Ms. Sekwiter listen to two groups with different solutions discuss how they saw the patterns. Ms. Lane taught the lesson and Ms. Sekwiter worked again with students. Class ended before Ms. Sekwiter asked two groups to compare solutions.

The final day of working with patterns, Ms. Lane and Ms. Sekwiter start planning for another problem that was more complex than the days before, the triangle problem. Ms. Lane asks, "How are we going to do this?" They each look at the pattern. Ms. Lane asks, "What should they have on their papers that shows that they understand the pattern?" What would we want to hear them discussing? They each worked the math in the problem. Ms. Lane creates different ways that students could find a rule for the figures. She is talking to herself about the various methods students could use and solutions. Ms. Sekwiter has found a solution to the problem and turns to organizing warm ups and worksheets that need to be copied for the day. Ms. Lane has her solution notes in front of Ms. Sekwiter working on them. Ms. Sekwiter walks away to go make a stack of copies near the door and find the attendance book

Ms. Lane looks up at Ms. Sekwiter and asks her, "What would be the a way to support students getting into the problem?" Ms. Sekwiter sits back down and says,

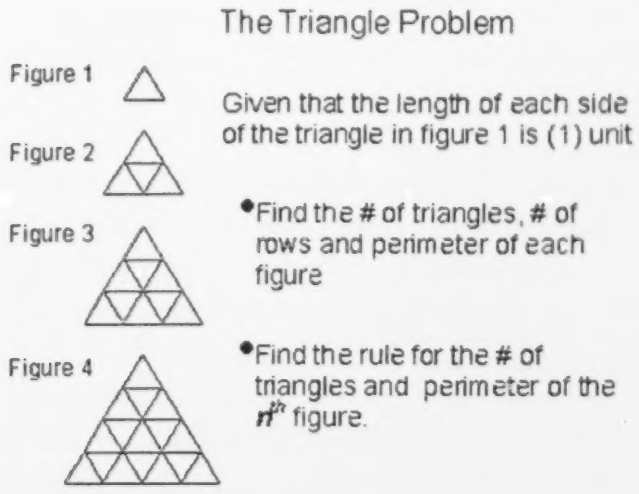

The Triangle Problem
Figure 1
Figure 2
Figure 3
Figure 4
Given that the length of each side of the triangle in figure 1 is (1) unit
•Find the # of triangles, # of rows and perimeter of each figure
•Find the rule for the # of triangles and perimeter of the $n^{th}$ figure.

*Figure 1.* The Triangle Problem.

"Well we could draw a chart and then have them follow us filling in the chart to find the patterns for each piece. And we could find one rule for them." Ms. Lane replies, What do you think some of them will understand about the numbers in the chart? Ms. Sekwiter says she is not sure, but, "I just think that if we show them one of the rules then they can follow what we have done and find the other rules." Ms. Sekwiter continues to elaborate on her idea that they should show the students a chart to organize their work. Ms. Sekwiter says that she thought about this all the way home yesterday, that a chart was what the students needed to see patterns more clearly. After three days of asking Ms. Sekwiter about making sense of students' solutions and Ms. Sekwiter suggesting ideas for teaching the lesson, Ms. Lane has reached a dead end with posing questions to foster reflection and assessment of students' thinking – Ms. Sekwiter is unwilling to modify her idea. Ms. Lane suggests to Ms. Sekwiter that she teach the pattern problem based on her idea of the chart.

Ms. Sekwiter teaches the lesson and Ms. Lane observes from her desk. Some students have trouble creating the chart and don't understand where Ms. Sekwiter is finding the numbers for each of the columns.

They ask questions and Ms. Sekwiter suggests they aren't paying attention. Ms. Sekwiter is working out each step of the chart. Some students have solved the problem

Ms. Sekwiter's Chart

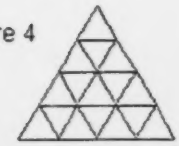
| | # rows | # triangles | perimeter |
|---|---|---|---|
| Figure 1 | 1 | 1 | 3 |
| Figure 2 | 2 | 4 | 6 |
| Figure 3 | 3 | 9 | 9 |
| Figure 4  | 4 | 16 | 12 |

*Figure 2.* Ms. Sekwiter's chart.

and are discussing their different solutions while Ms. Sekwiter is working at the front of the class with the chart. Class ends before Ms. Sekwiter models finding a rule.

Ms. Lane asks Ms. Sekwiter, "How do you think it went?" Ms. Sekwiter responds, "Well it didn't go too badly. Those that needed the chart at least saw how to organize their work." She adds, the class had quite a few students who had been absent so those students lacked experience with patterns. Ms. Lane asked Ms. Sekwiter what one student was thinking when he asked "look the numbers are growing from one step to the next." Ms. Sekwiter said that she saw that he was basing the pattern on the previous number but she wanted to get to general rule. She added that the student that brought that up was also not paying attention during most of her discussion. Ms. Lane asked Ms. Sekwiter about running out of time and how she might modify the lesson. Ms. Lane suggested that she didn't realize she had run out of time until there was only three minutes left. Adding, that the clock in the room was difficult to see since it was at the front of the class. Ms. Sekwiter suggested that the students in the afternoon class were not as easily distracted so it would probably go better the next time.

Ms. Sekwiter had difficulty making sense of lesson and knowing how she could modified the lesson to address the issues. Ms. Lane said that she would teach part of the afternoon lesson and that Ms. Sekwiter could watch how she worked with the pattern problem.

**Patterns of Interaction**

Early in the semester Ms. Lane worked with Ms. Sekwiter on developing, questioning, and modifying ideas through reflection. Ms. Lane was attempting to build Ms. Sekwiter's content and pedagogical content knowledge through refection on experience. Refection focused on mathematical ideas, students' conceptions, and formative assessment of student discourse and written work. This reflective process was difficult for both Ms. Lane and Ms. Sekwiter. Ms. Lane had created a form of participation in mentoring in which she attempted to engage in meaningful conversation, yet Ms. Sekwiter was focused on trying ideas. Mentoring early in the semester developed into a pattern of miscommunication, in which both Ms. Sekwiter and Ms. Lane communicated their ideas of how to participate in mentoring without the other listening.

The participants' orientations to mentoring learning to teach framed how they participated in mentoring events and the resulting miscommunication. Ms. Sekwiter's trying ideas orientation guided her to pursue ideas and gain experience teaching. Her orientation did not include deep reflection on ideas. This orientation was built on Ms. Sekwiter's previous field experiences from which she came to understand learning to teach as gaining experiences and a mentor's job was to tell her how to improve on her teaching strategies. Contributing to Ms. Sekwiter's guiding orientation was her understanding of the work of teaching. For Ms. Sekwiter teaching was about collecting interesting and fun activities that engaged students in doing math. However, she was not clear on what the important mathematical ideas were and how she would make the

math explicit in her fun activities. Ms. Sekwiter gathered these activities from teacher friends, searching the internet and teacher resource workbooks. Most prominent in her discussions of these resources was Ms. Sekwiter's associations with teachers that would share activities with her to try during student teaching. Ms. Sekwiter was creating her bag of tricks by gathering activities from other teachers.

Ms. Lane believed the collaboration was at the heart of mentoring learning to teach early in the experience. Ms. Lane's reflective orientation to mentoring framed how she understood the job of learning to teach and her role in that process. In-depth conversations about teaching, learning and mathematics were essential to developing as a teacher. Ms. Lane was a long-standing member and leader in reform-based professional development. She suggested that she based her understanding of learning to teach on these experiences, importing the purpose of mentoring learning to teach from this professional community.

As the semester progressed Ms. Lane became more frustrated with Ms. Sekwiter's lack of reflection and willingness to question and modify her ideas. Ms. Lane came to understand that Ms. Sekwiter was not able to see all the complexity of teaching while they were collaboratively teaching. She commented that Ms. Sekwiter was "not open to learning" anything more from sharing the responsibility for teaching. As a result, Ms. Lane shifted how she and Ms. Sekwiter participated in mentoring. Ms. Lane suggested that Ms. Sekwiter begin her solo teaching time in which Ms. Sekwiter would be responsible for all the teaching.

**Findings - During Solo Teaching**

Even though Ms. Sekwiter expressed that she saw her placement as "fitting right in with [her] previous placements" her orientation of trying her ideas, conflicted with Ms. Lane's orientation of reflection and discussion that framed her participation in mentoring. The differing orientations precluded Ms. Sekwiter from engaging in reflective discussion with Ms. Lane. Ms. Lane's process for collaboratively teaching was not understood by Ms. Sekwiter as an appropriate means of engaging in mentoring. Ms. Lane struggled to understand Ms. Sekwiter's ways of engaging in mentoring. About a month into the semester Ms. Lane suggested that she would have to "figure out" how to work with Ms. Sekwiter. Prior to soloing, her process for figuring this out included trying a variety of methods to engage in reflection, each garnering only limited success.

Soloing proved to be a vehicle for Ms. Sekwiter and Ms. Lane to begin to discuss the complexities of teaching reform-based mathematics. After a number of unsuccessful teaching episodes in which Ms. Sekwiter was baffled by students' behavior, Ms. Sekwiter began to reflect, ask questions and examine her practice with the guidance of Ms. Lane. The change in participation – soloing-- facilitated by Ms. Lane, was a catalyst for Ms. Sekwiter's development in learning to teach. In addition, Ms. Sekwiter reviewed the text and surmised that she did not know how to facilitate the

mathematical ideas suggested in the teacher's notes. She came to Ms. Lane with questions, asking for help. This was a shift in their ways of participating in mentoring. Ms. Sekwiter began to develop new ways of communicating about teaching. She began to look deeper and reflect on her instruction.

**Analysis**

The forms of participation that constituted mentoring practices early in the semester did not provide for Ms. Sekwiter to try her ideas to the full extent that she believed was appropriate. These forms of participation were constructed by Ms. Lane, with the intention of incorporating Ms. Sekwiter's ideas, but these opportunities were less than successful. Ms. Lane thought that Ms. Sekwiter's lack of reflection constrained their collaboration and Ms. Sekwiter's learning to teach. Ms. Sekwiter thought that Ms. Lane's need for reflective discussion on ideas was not part of her job as a mentee and simply was Ms. Lane controlling her access to trying her ideas. The participants' guiding orientations framed how they participated in mentoring. The forms of participation did not facilitate development in learning to teach until Ms. Lane shifted the nature of the work. Consequently, Ms. Lane backed away from her attempts to make Ms. Sekwiter engage in reflection *prior to* taking full responsibility for teaching and suggested that she start her solo teaching time. This shift in participation was a marker of development in the case.

Development in learning to teach in this study was examined on three planes of analysis. On the individual plane, participants' orientations were the unit of analysis which uncovered how participation in mentoring was guided by the mentor and mentee's experiences and understandings of mentoring leaning to teach. These guiding frameworks informed how participants engaged in mentoring interactions. On the second plane of analysis, forms of participation constituting mentoring were examined for shifts in participation that marked development of the participants. On the third plane of analysis, the nature of the apprenticeship was examined to understand how mentoring was a sociocultural practice. Apprenticeship, "focuses on the *system* of interpersonal involvements and arrangements in which people engage in culturally organized activity." (Rogoff, 1995, p. 143) The emphasis on this plane is not the actions of the participants, but the ways these actions are bound by normative practices of the larger institutional or cultural context.

Wertsch, Minick and Arns (1984) suggest that to understand individuals' actions when engaged in activity we must look to the sociocultural context in which the activity is situated. Participants import ways of acting from these familiar settings to guide participation in other cultural activity. In this mentoring case the other cultural activities that related to mentoring were the professional communities in which Ms. Lane was a member and that Ms. Sekwiter had associated with prior to and outside of student teaching. These were different communities that had different normative practices.

Ms. Lane imported the reflection, discussion and content she engaged in while attending and leading reform-oriented mathematics professional development. Ms. Lane participated in two long-term professional development projects during the year of the study, devoted to mentoring and reform-based teaching. These opportunities were formative to her mentoring of Ms. Sekwiter. She suggested that her purpose for mentoring was to facilitate a student teacher's entrance into the profession by adopting the normative practices of the reform-based community. For example, Ms. Lane's discussion of students' conceptions, mathematical big ideas and formative assessment were topics in her professional development experiences as well as embedded in her instructional practices. Her experience of reflecting on these topics in professional development permeated what she understood as important to learn during student teaching. Furthermore, Ms. Lane was being mentored during this semester of observations by an experienced reform-based teacher that she respected. Ms. Lane capitalized on this experience by reflecting and incorporating into her mentoring of Ms. Sekwiter what and how she discussed teaching and learning with her mentor. These professional development opportunities were Ms. Lane's more familiar activity settings that informed her purpose for mentoring and her interactions.

Ms. Sekwiter's imported the ways of interacting that she had developed in her early field experiences and what she understood to be important to teaching gained through conversations with teacher associates. Each of these contexts provided Ms. Sekwiter with evidence that teaching was about gaining experience and trying different ideas. She commented that she did not witness her previous mentor needing to reflect on their experiences nor engage in a process of discussion and modification. Ms. Sekwiter's orientation to mentoring and her participation were guided by the normative ways of thinking and acting that she witnessed in previous teaching experiences and associations with teachers.

## Implications

Ms. Lane's purpose for participation in mentoring, the forms of participation constructed and her orientation to mentoring, was commendable and embodied many of the suggested best practices of mentoring (Peterson & Williams, 1998). The content of her mentoring focused on learning to teach reform-based mathematics using notions of professional skills such as reflection that are central in the NCTM Principles and Standards. However, when examining the outcomes of the mentoring interactions Ms. Lane's orientation and forms of participation were less than fruitful. Ms. Sekwiter's focus on trying her ideas was typical of student teachers, but it did not facilitate reflection on her practice (Borko & Mayfield, 1995; Elliott & Calderhead, 1993). What guided these the participants' orientations to mentoring and the ways of participating were the participants' membership in professional community and previous experience with the profession. The differences observed between the mentor and mentee were not merely individuals' different perceptions, rather they were the participants'

familiar activity settings that served to orient their mentoring activity (Wertsch, Minnick, & Arns, 1984).

The data in this paper illustrated how the cultural practices of professional communities impacted the social interactions and individual orientations that inform mentoring activity. This research coordinated the individual, social and cultural influences on learning to teach by examining development in sociocultural activity. One implication of the work suggests that mentors and mentees need support to develop cohesive orientations to mentoring. In addition, mentor education, long reported as important for developing strong mentors, proved to be important to the content of mentoring (Feiman-Nemser, Parker & Zeichner, 1993). However, the nature of mentor education has been broadened by this study to include the professional development focused on reform-based mathematics. Furthermore, mentee education must also be included in the call for support of mentoring activity. There is a need to leverage the learning opportunities in student teaching and previous field experiences coordinated with the theoretical perspectives represented in teacher education to develop sound mentee education.

**References**

Borko, H., & Mayfield, V. (1995). The roles of the cooperating teacher and university supervisor in learning to teach. *Teaching and Teacher Education, 11*, 501-518.

Elliott, B., & Calderhead, J. (1993). Mentoring for teacher development: Possibilities and caveats. In D. McIntyre, H. Hagger, & M. Wilson (Eds.), *Mentoring: Perspectives on school-based teacher education* (pp. 166-189). London: Kogan Page.

Feiman-Nemser, S., Parker, M. B., & Zeichner, K. (1993). Are mentor teachers teacher educators? In D. McIntyre, H. Hagger, & M. Wilkin (Eds.), *Mentoring: Perspectives on school-based teacher education* (pp. 147-165). London: Kogan Page.

Hawkey, K. (1997). Roles, responsibilities, and relationships in mentoring: A literature review and agenda for research. *Journal of Teacher Education*, 48, 325-335.

McIntyre, D. J., Byrd, D. B., & Foxx, S. M. (1996). Field and laboratory experiences. In J. Sikula, T. J. Buttery, & E. Guyton (Eds.), *Handbook of research on teacher education*, (2nd ed., pp. 171-193). New York: Macmillan.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Peterson, B. E., & Williams, S. R. (1998). Mentoring beginning teachers. *Mathematics Teacher, 91*, 730-734.

Rogoff, B. (1997). Evaluating development in the process of the participation: Theory, methods, and practice building on each other. In E. Amsel & A. Renninger (Eds.). *Change and development* (pp. 265-285). Hillsdale, NJ: Erlbaum.

Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided appropriation, and apprenticeship. In J.V. Wertsch, P. Del Rio, & A. Alvarez (Eds.). *Sociocultural studies of mind*. (pp. 139-164). New York: Cambridge University Press.

Stanulis, R. N., & Russell, D. (1998, April). *'Jumping –in': Trusting and communication in mentoring student teachers*. Paper presented as the meeting of the American Educational Research Association, San Diego, CA.

Warren-Little, J. (1990). The mentor phenomenon and the social organization of teaching. In C. B. Cazden (Ed.), *Review of Research in Education* (Vol. 16, pp. 297-351). Washington, DC: AERA.

Wertsch, J.V., Minnick, N., & Arns, F.J. (1984). Creation of context in joint problem solving. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context*. (pp. 151- 171). Cambridge, MA: Harvard University Press.

Zeichner, K. M. (1986). Content and contexts: Neglected elements in studies of student teaching as an occasion for learning to teach. *Journal of Education for Teaching*, 12(1), 5-25.

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